

IN THE CLAIMS:

Please substitute the following amended claims for those with the same number:

1. (Currently amended) A method for determining optimum bond parameters for a bond force F_B and an ultrasonic variable P_B and, optionally, at least one further bond parameter G_B of a Wire Bonder for a bond process, whereby for this determination a number of bond cycles are carried out, whereby for each bond cycle a wire connection is made between a connection point of a semiconductor chip and a connection point of a substrate in that a wire end protruding out of a capillary is melted into a ball and then, in a bond position, the wire ball is attached to the connection point of the semiconductor chip, then the wire pulled through to the required length, formed into a wire loop and attached to the connection point of the substrate, and whereby the bond force F_B , the ultrasonic variable P_B and, if necessary, the at least one further bond parameter G_B are each varied in discrete steps within a predefined range, wherein with each bond cycle n , after attaching the wire ball to the connection point of the semiconductor chip, the following steps are carried out:

- a) Application of a predetermined bond force F_{B1} ,
- b) Movement of the capillary out of the bond position in a predetermined direction whereby the current $I_n(t)$ flowing through the drive which moves the capillary is monitored in the course of time t ,
- c) Stopping the movement of the capillary as soon as the current $I_n(t)$ reduces decreases,
- e) Determining the maximum of the current $I_{n,max}(F_{B,n}, P_{B,n}, G_{B,n})$ from the progression of the current $I_n(t)$ established during steps b) and c) whereby the variables $F_{B,n}$, $P_{B,n}$ and $G_{B,n}$ are the values for bond force F_B , the ultrasonic variable P_B and, if necessary, the at least one further bond parameter G_B set for bond cycle n ,

and wherein from the values $I_{n,max}(F_{B,n}, P_{B,n}, G_{B,n})$ established with the n bonding processes those values for the bond force F_B , the ultrasonic variable P_B and the, if necessary, at least one further bond parameter G_B are determined as optimum bond parameters for which the current $I_{n,max}(F_{B,n}, P_{B,n}, G_{B,n})$ reaches a maximum.

2. (Currently amended) A method for determining the optimum bond parameters for a bond force F_w and an ultrasonic variable P_w and, optionally, at least one further bond parameter G_w of a Wire Bonder for a bonding process, whereby for this determination a number of bond cycles are carried out, whereby for each bond cycle a wire connection is made between a connection point of a semiconductor chip and a connection point of a substrate, in that a wire end protruding out of a capillary is melted into a ball and then, in a bond position, the wire ball is attached to the connection point of the semiconductor chip, then the wire pulled through to the required length, formed into a wire loop and attached to the connection point of the substrate, and whereby the bond force F_w , the ultrasonic variable P_w and, if necessary, the at least one further bond parameter G_w are each varied in discrete steps within a predefined range, wherein with each bond cycle n after attaching the wire to the connection point of the substrate the following steps are carried out:

- a) Application of a predetermined bond force F_{w1} ,
- b) Movement of the capillary out of the bond position in a predetermined direction whereby the current $I_n(t)$ flowing through the drive which moves the capillary is monitored in the course of time t ,
- c) Stopping the movement of the capillary as soon as the current $I_n(t)$ reduces decreases,
- f) Determining the maximum of the current $I_{n,max}(F_{w,n}, P_{w,n}, G_{w,n})$ from the progression of the current $I_n(t)$ established during steps b) and c) whereby the variables $F_{w,n}$, $P_{w,n}$ and $G_{w,n}$ are the values for bond force F_w , the ultrasonic variable P_w and, if necessary, the at least one further bond parameter G_w set for bond cycle n ,

and wherein from the values $I_{n,max}(F_{w,n}, P_{w,n}, G_{w,n})$ established with the n bonding processes those values for the bond force F_w , the ultrasonic variable P_w and the, if necessary, at least one further bond parameter G_w are determined as optimum bond parameters for which the current $I_{n,max}(F_{w,n}, P_{w,n}, G_{w,n})$ reaches a maximum.

3. (Currently amended) A method for in situ monitoring of the quality of bond connections which are produced by means of a wire-feeding capillary of a Wire Bonder with predetermined values F_1 , P_1 , G_1 of a bond force F , an ultrasonic variable P and at least one further bond parameter G , wherein a to be tested, selected bond connection is made as follows:

Making a bond connection with predefined values F_2 , P_2 , G_2 for the bond force F , the ultrasonic variable P and the at least one further bond parameter G , whereby at least one of the values F_2 , P_2 , G_2 is less than the corresponding value F_1 , P_1 , G_1 .

Carrying out a test according to the following steps:

- a) Application of a predetermined bond force F_3 ,
- b) Movement of the capillary out of the bond position in a predetermined direction whereby the current $I_n(t)$ flowing through the drive which moves the capillary is monitored over the course of time t ,
- c) Stopping the movement of the capillary as soon as the current $I(t)$ ~~reduces~~ decreases,
- d) Determining the maximum current $I_{\max}(F_3, P_3, G_3)$ from the progression of the current $I(t)$ established during steps b) and c);

and

Making the bond connection with the values F_1 , P_1 , G_1 .